

# UNDERWATER BRIDGE INSPECTION REPORT

---

STRUCTURE NO. 7248

CSAH NO. 3

OVER THE

RED LAKE RIVER

DISTRICT 2 - PENNINGTON COUNTY

---



---

PREPARED FOR THE  
MINNESOTA DEPARTMENT OF TRANSPORTATION

BY  
COLLINS ENGINEERS, INC.

JOB NO. 5221 (CEI 161)

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 7248, Piers 1 through 3, were found to be in good condition with no defects of structural significance observed. No appreciable changes have occurred to the footing exposure at the columns of Pier 2 since the previous inspection. The channel bottom appeared to be in stable condition, however, noticeable changes including shoreline erosion and both channel aggregation and degradation were observed at the bridge fascias. The amount of debris accumulated at Piers 1 and 2 has decreased since the last inspection.

INSPECTION FINDINGS:

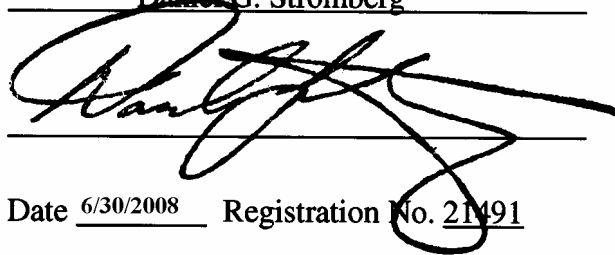
- (A) A scour pocket, 3 feet in radius with a depth of 1 foot, was observed at the upstream nose of Pier 2. The scour pocket exposed the top of the footing at 5.7 feet below the waterline with no vertical exposure.
- (B) Light scaling was observed around all columns on all piers from 1 foot above to 3 feet below the waterline with a maximum penetration of 1/4 inch.
- (C) A light accumulation of timber debris consisting of 6-inch-diameter or smaller branches was observed at the upstream nose of the upstream column of Pier 2 from the channel bottom up 2 feet. The debris accumulation was 10 feet long (E/W) and 5 feet wide (N/S).
- (D) A heavy accumulation of timber debris consisting of 12-inch-diameter or smaller logs and branches was observed at the upstream end of the upstream column and along both faces to the downstream end of the downstream column of Pier 2. The debris extended from the channel bottom to a maximum 2 feet above the waterline, and up to 6 feet off the pier faces and 8 feet off the upstream nose.

RECOMMENDATIONS:

- (A) Determine the significance of the footing exposure at Pier 2 by reviewing the design drawings to determine if the pier footings are founded on piles. If the columns are founded on piles, monitor the extent of footing exposure during future inspections. If the columns are founded on spread footings, then countermeasures may be required.
- (B) Remove the accumulations of timber debris at Piers 1 and 2 to eliminate the potential for continued accumulation and to halt any scour or erosion influenced by the accumulation.
- (C) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

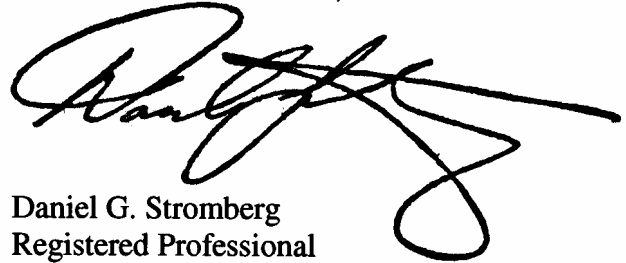
Daniel G. Stromberg



Date 6/30/2008 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.



Daniel G. Stromberg  
Registered Professional  
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 7248

Feature Crossed: The Red Lake River

Feature Carried: CSAH No. 3

Location: District 2 - Pennington County

Bridge Description: The superstructure consists of four spans of multiple steel beams supporting a reinforced concrete deck. The superstructure is supported by two reinforced concrete abutments and three reinforced concrete piers. No design drawings were available to determine foundation type.

2. INSPECTION DATA

Professional Engineer Diver: Bradley A. Syler, P.E., S.E.

Dive Team: John Joftus, Valerie Roustan

Date: August 18, 2007

Weather Conditions: Sunny,  $\pm 70^{\circ}$  F

Underwater Visibility:  $\pm 5.0$  Feet

Waterway Velocity:  $\pm 1.0$  fps

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1, 2, and 3

General Shape: The piers each consist of two hexagonal reinforced concrete columns supporting a rectangular reinforced concrete pier cap. The columns are founded on rectangular footings, but it is unknown if the footings are spread type or pile supported.

Maximum Water Depth at Substructure Inspected: Approximately 5.7 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap on the downstream end of Pier 2.

Water Surface: The waterline was approximately 13.8 feet below reference.  
Assumed Waterline Elevation = 86.2.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 7

Item 61: Channel and Channel Protection: Code 5

Item 92B: Underwater Inspection: Code B/08/07

Item 113: Scour Critical Bridges: Code I/94

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

\_\_\_\_\_ Yes X No



Photograph 1. Overall View of the Structure, Looking South.



Photograph 2. View of Pier 1, Looking Northwest.



Photograph 3. View of Pier 2, Looking Southeast.



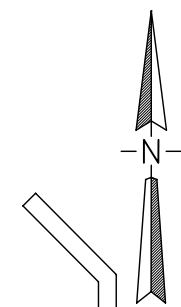
Photograph 4. View of Pier 3, Looking Northwest.



Photograph 5. View of Timber Debris at Pier 1, Looking Southwest.

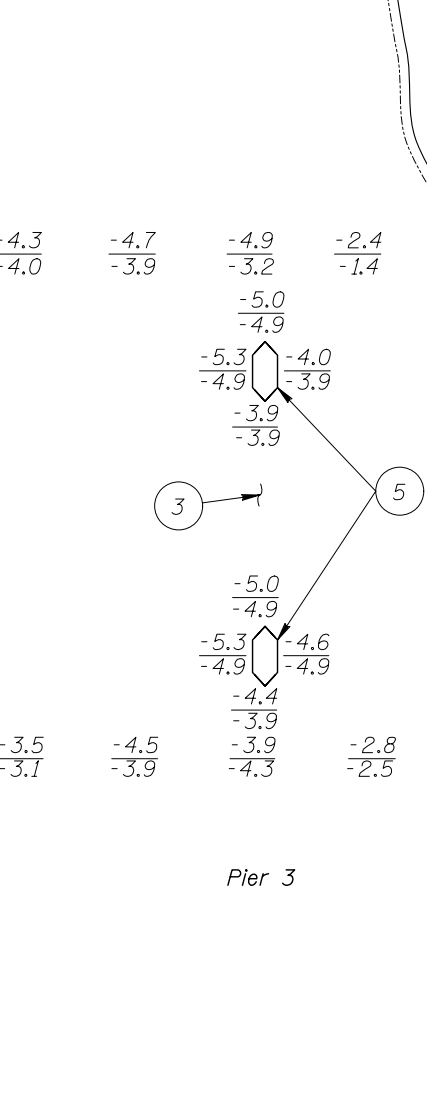
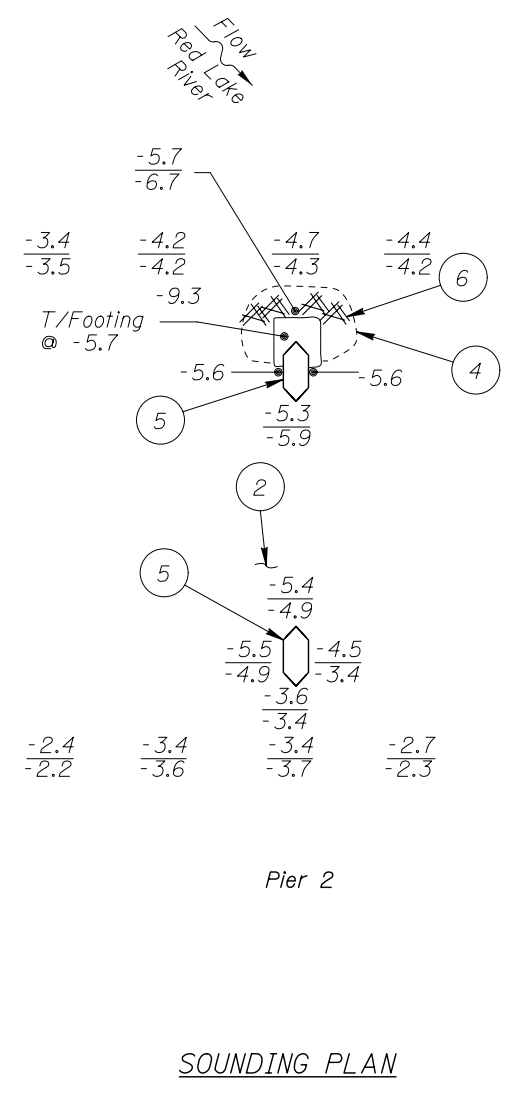
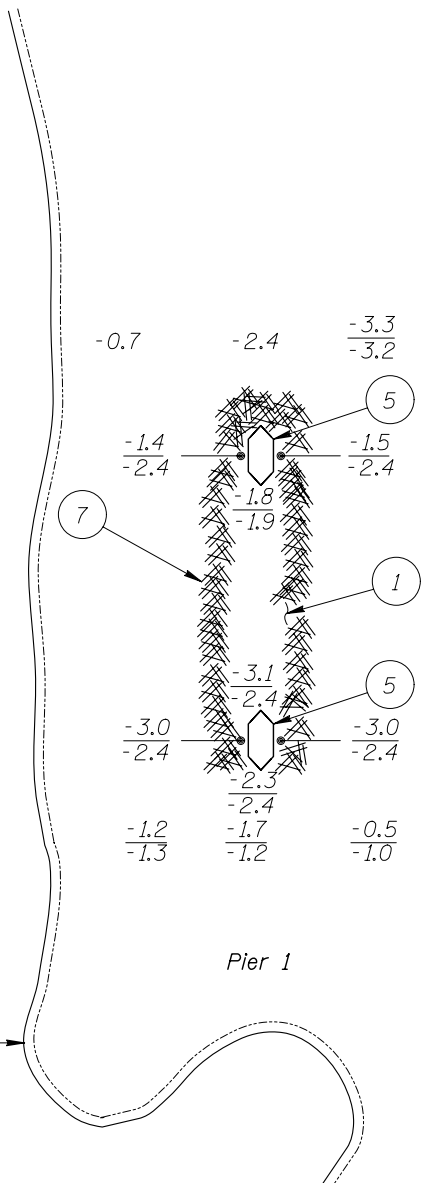


Photograph 6. View of West Abutment looking Northwest.



West Abutment

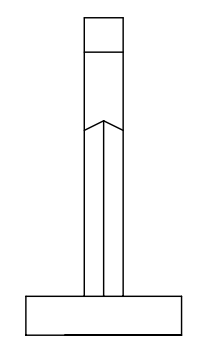
Shoreline  
(Typ.)



East Abutment

GENERAL NOTES:

- Piers 1, 2, and 3 were inspected underwater.
- At the time of inspection on August 18, 2007, the waterline was located approximately 13.8 feet below the top of the pier cap on the downstream end of Pier 2. Design plans were not available, therefore a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 86.2.
- Soundings indicate the water depth at the time of inspection and are measured in feet.
- Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.



TYPICAL END VIEW OF PIERS  
Presence or absence of piles could not be determined.

INSPECTION NOTES:

- The channel bottom material consisted of soft, silty infill with up to 2 feet of probe rod penetration around Pier 1.
- The channel bottom material at Pier 2 consisted of fine sand and random cobbles of up to 1 foot in diameter with up to 1 foot of probe rod penetration.
- The channel bottom material consisted of fairly firm sandy gravel with 3 to 6 inch diameter cobbles and a probe rod penetration of up to 6 inches around Pier 3.
- A scour pocket, 3 feet in radius with a depth of 1 foot, was observed at the upstream nose of Pier 2. The scour pocket exposed the top of the footing at 5.7 feet below waterline with no vertical exposure.
- Light scaling was observed around all columns from 1 foot above to 3 feet below the waterline with 1/4 inch of maximum penetration.

SOUNDING PLAN

- A light accumulation of timber debris consisting of 6 inch diameter or smaller branches was observed at upstream nose of the upstream column of Pier 2 from channel bottom up 2 feet. The debris accumulation was 10 feet long (E-W) and 5 feet wide (N-S).
- A heavy accumulation of timber debris consisting of 12 inch diameter or smaller logs and branches was observed at upstream end of upstream column and along both faces to the downstream column of Pier 2. The debris extended from channel bottom to 2 feet max above the waterline, and up to 6 feet off pier faces and 8 feet off upstream nose.

Legend

- 3.6 Sounding Depth (8/18/07)
- 3.2 Sounding Depth (8/27/02)

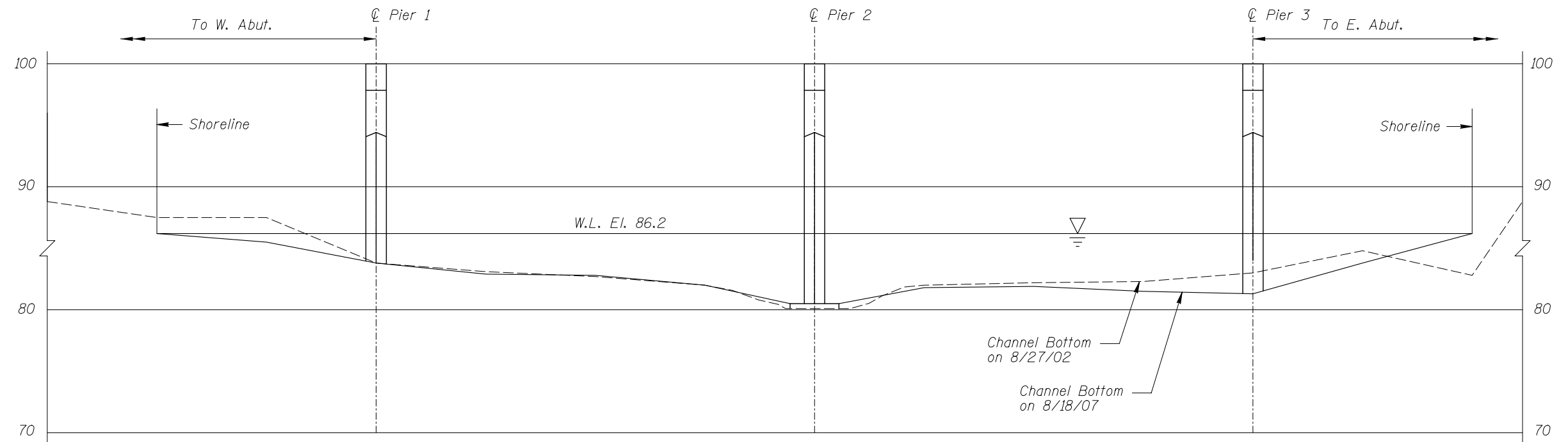
Timber Debris

Scour Depression

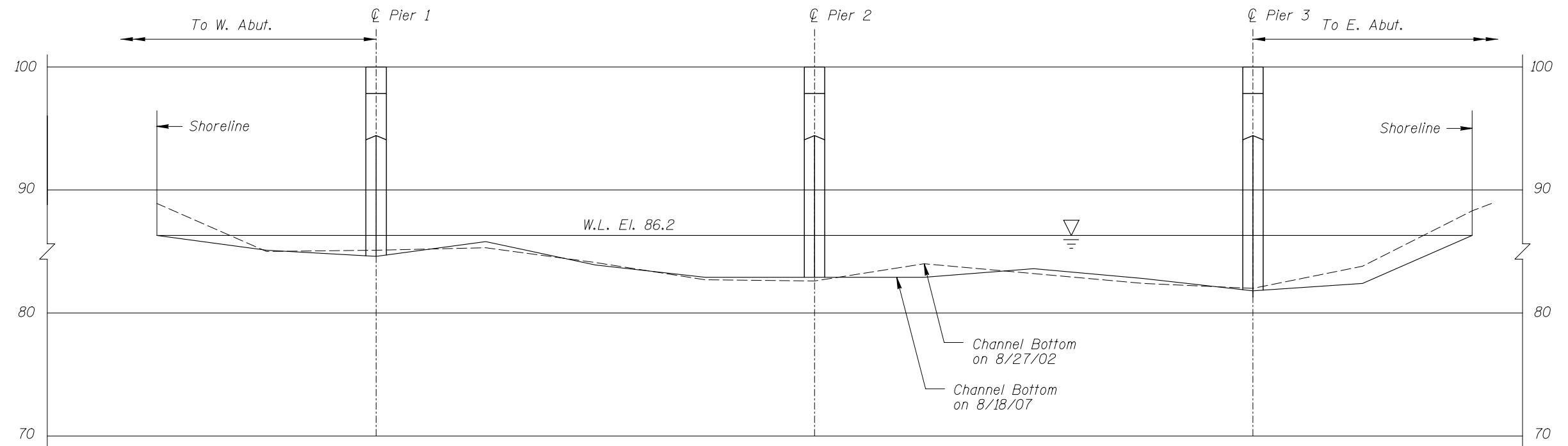
Note:

All soundings based on 2007 waterline location.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 7248 OVER THE RED LAKE RIVER DISTRICT 2, PENNINGTON COUNTY		
INSPECTION AND SOUNDING PLAN		
Drawn By: PRH	<b>COLLINS ENGINEERS</b>	Date: AUGUST, 2007
Checked By: MDK		Scale: NTS
Code: 52210161		Figure No.: 1



**UPSTREAM FASCIA PROFILE**  
Vertical Scale: 1"=10'-0"



**DOWNSTREAM FASCIA PROFILE**  
Vertical Scale: 1"=10'-0"

Note:  
Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 7248 OVER THE RED LAKE RIVER DISTRICT 2, PENNINGTON COUNTY		
UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: PRH	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 500 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: AUGUST, 2007
Checked By: MDK		Scale: NTS (U.O.N.)
Code: 52210161		Figure No.: 2

MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES  
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: August 18, 2007

ON-SITE TEAM LEADER: Bradley A. Syler, P.E., S.E.

BRIDGE NO: 7248 WEATHER: Sunny, ±70° F

WATERWAY CROSSED: The Red Lake River

DIVING OPERATION: X SCUBA        SURFACE SUPPLIED AIR  
       OTHER       

PERSONNEL: John Loftus, Valerie Roustan

EQUIPMENT: Scuba, U/W Light, Scraper, Lead Line, Probe Rod, Camera

TIME IN WATER: 5:00 P.M.

TIME OUT OF WATER: 5:55 P.M.

WATERWAY DATA: VELOCITY ±1.0 f.p.s.

VISIBILITY ±5.0 feet

DEPTH 5.7 feet maximum at Pier 2

ELEMENTS INSPECTED: Piers 1, 2 and 3

REMARKS: Overall, the piers were found to be in good condition with no defects of structural significance observed. At Pier 2 a scour pocket exposed the top of footing at 5.7 feet below the waterline with no vertical exposure. Light scaling was observed on all columns from 1 foot above to 3 feet below the waterline with 1/4 inch of maximum penetration. A light accumulation of 6-inch-diameter and smaller timber debris was observed at the upstream nose of the upstream column of Pier 2 from the channel bottom up 2 feet. The debris accumulation was 10 feet long to the East and West, by 5 feet wide to the North and South. A heavy accumulation of timber debris consisting of 12-inch diameter or smaller logs and branches was observed at the upstream end of the upstream column and along both faces of the downstream end of Pier 2. The channel bottom material consisted of soft, silty infill with up to 2 feet of probe rod penetration around Pier 1. The channel bottom around Piers 2 and 3 consisted of sand and gravel with 6 inches to 1 foot of probe rod penetration.

FURTHER ACTION NEEDED:   X   YES        NO

#### FURTHER ACTION NEEDED (CONTINUED)

Determine the significance of the footing exposure at Pier 2 by reviewing the design drawings to determine if the pier footings are founded on piles. If the columns are founded on piles, monitor the extent of footing exposure during future inspections. If the columns are founded on spread footings, then countermeasures may be required.

Remove the accumulations of timber debris at Piers 1 and 2 to eliminate the potential for continued accumulation and to halt any scour or erosion influenced by the accumulations.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 7248  
INSPECTORS Collins Engineers, Inc.  
ON-SITE TEAM LEADER Bradley A. Syler, P.E., S.E.  
WATERWAY CROSSED The Red Lake River

INSPECTION DATE August 18, 2007  
NOTE: USE ALL APPLICABLE CONDITION  
DEFINITIONS AS DEFINED IN THE MINNESOTA  
RECORDING AND CODING GUIDE INCLUDING  
GENERAL, SUBSTRUCTURE, CHANNEL AND  
PROTECTION, AND CULVERTS AND WALL  
DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

UNIT REFERENCE NO.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	SUBSTRUCTURE						CHANNEL					GENERAL					
			PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER (BRACING)	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 1	3.0'	N	7	N	9	N	7	8	6	6	5	5	7	N	N	N	N	N
	Pier 2	5.7'	N	7	7	9	N	7	7	N	N	N	7	7	N	N	N	N	N
	Pier 3	5.3'	N	7	N	9	N	7	N	7	7	7	7	7	N	N	N	N	N

\*UNDERWATER PORTION  
ONLY

REMARKS: Overall, the piers were found to be in good condition with no defects of structural significance observed. At Pier 2 a scour pocket exposed the top of footing at 5.7 feet below the waterline with no vertical exposure. Light scaling was observed on all columns from 1 foot above to 3 feet below the waterline with 1/4 inch of maximum penetration. A light accumulation of 6-inch-diameter and smaller timber debris was observed at the upstream nose of the upstream column of Pier 2 from the channel bottom up 2 feet. The debris accumulation was 10 feet long to the East and West, by 5 feet wide to the North and South. A heavy accumulation of timber debris consisting of 12-inch diameter or smaller logs and branches was observed at the upstream end of the upstream column and along both faces of the downstream end of Pier 2. The channel bottom material consisted of soft, silty infill with up to 2 feet of probe rod penetration around Pier 1. The channel bottom around Piers 2 and 3 consisted of sand and gravel with 6 inches to 1 foot of probe rod penetration.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.  
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.